FEDERATED MALAY STATES.

ANNUAL REPORT

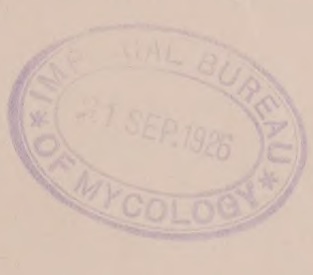
ON THE

DEPARTMENT OF AGRICULTURE,

S.S. AND F.M.S.,

FOR THE YEAR

1925



BY

B. J. EATON,

Acting Secretary for Agriculture, S.S. and F.M.S.

KUALA LUMPUR:

PRINTED AT THE FEDERATED MALAY STATES GOVERNMENT PRESS.

1926.

14-7-1926.

CONTENTS.

FEDERATED MALAY STATES.

REPORT OF THE SECRETARY FOR AGRICULTURE, STRAITS SETTLEMENTS AND FEDERATED MALAY STATES, FOR THE YEAR 1925

STAFF.

1. SECRETARY FOR AGRICULTURE.—Mr. G. E. Shaw, O.B.E., was in charge of the Department as Acting Secretary for Agriculture until 23rd October, 1925, when Mr. A. S. Haynes returned from leave. Mr. Shaw assumed charge again on the 16th November until 10th December from which date Mr. B. W. Elles acted as Secretary for Agriculture.

2. ASSISTANT TO SECRETARY FOR AGRICULTURE.—Mr. W. N. C. Belgrave (Plant Physiologist) acted until 27th November and Mr. D. H. Grist (Agricultural Economist) from November 27th to December 31st in addition to his own duties.

3. CHEMICAL DIVISION.—Major B. J. Eaton, O.B.E., Agricultural Chemist, returned from leave and resumed duty as Agricultural Chemist on the 2nd January.

   ASSISTANT AGRICULTURAL CHEMISTS.—Mr. R. O. Bishop, M.B.E. Major C. D. V. Georgi, O.B.E. (on leave from 17th January to 22nd October). Mr. V. R. Greenstreet (on leave from 29th May till 31st December). Mr. J. H. Dennett (on leave from 5th November till 31st December).

   ASSISTANT ANALYST.—Mr. Gun Lay Teik.

4. FIELD DIVISION.—Mr. F. W. South was in charge as Chief Agricultural Field Officer till 27th September when he proceeded on leave. Mr. F. Birkinshaw acted as Chief Agricultural Field Officer from 27th September till 31st December.

5. AGRICULTURAL FIELD OFFICERS.—The Agricultural Field Officers who are now transferred to State Estimates, were distributed as follows:

   PERAK NORTH.—Mr. F. Birkinshaw from January 1st to September 26th. Mr. G. E. Mann from October 2nd to December 31st.

   PERAK SOUTH.—Mr. A. A. Campbell from January 1st to May 31st. Mr. T. D. Marsh (Assistant Agriculturist) from June 1st to July 14th. Mr. J. W. Jolly (Temporary Agricultural Field Officer) from July 15th to December 31st.

   SELANGOR.—Raja Mahmud from January 1st to March 31st. Mr. H. D. Meads (Temporary Agricultural Field Officer), April 1st to September 20th. Mr. F. Birkinshaw from October 1st to December 31st, in addition to duties as Chief Agricultural Field Officer.

   NEGRI SEMBILAN.—Mr. W. H. Barnes (Temporary Agricultural Field Officer).

   PAHANG WEST.—Mr. G. E. Mann from January 1st to October 1st. Mr. H. D. Meads from October 2nd to December 31st.

   PAHANG EAST.—Mr. J. C. Sworder (Temporary Agricultural Field Officer).

6. MYCOLOGICAL DIVISION.—Mr. A. Sharples (Mycologist) was in charge of the Division throughout the year.
   ASSISTANT MYCOLOGISTS.—Mr. A. Thompson, Mr. F. S. Ward.

7. ENTOMOLOGICAL DIVISION.—Mr. G. E. Corbett (Entomologist) was in charge of the Division from the 1st August when he resumed duty on return from leave, till the end of the year. Mr. B. A. R. Gater (Assistant Entomologist) was in charge from 1st January till 31st July.

8. PLANT PHYSIOLOGIST DIVISION.—Mr. W. N. C. Belgrave (Plant Physiologist) was in charge of the Division till he proceeded on leave on the 27th November when Mr. R. O. Bishop, M.B.E. (Assistant Agricultural Chemist) was appointed to act.

9. Botanical Division.—Mr. H. W. Jack (Economic Botanist) was in charge of the Division from 1st January to 22nd May when he proceeded on leave. Mr. W. N. Sands (Assistant Economic Botanist) was in charge from 23rd May till the end of the year.

Assistant Economic Botanist.—Mr. W. N. Sands (on leave from 1st January to 9th February).

10. Agricultural Division.—Mr. B. Bunting (Agriculturist) was in charge of the Division from 24th April, when he resumed duty on return from leave, till end of the year. Mr. J. N. Milsum (Assistant Agriculturist) was in charge from 1st January till 23rd April.

Mr. F. G. Spring (Agriculturist, Rubber) was in charge of the Agricultural Division (Rubber) throughout the year.

Assistant Agriculturists.—Mr. J. N. Milsum, Mr. E. A. Curtler, Mr. T. D. Marsh (on leave from 20th November, 1925, till 20th July, 1926), Mr. J. Lambourne, Mr. H. D. Meads (Temporary Assistant Agriculturist), from January 1st to March 31st.

11. Economics Division.—Mr. D. H. Grist was in charge throughout the year.

12. Agricultural Instruction (Malay Officers).—Captain J. M. Howlett, m.c., was in charge throughout the year. Raja Mahmud was appointed Assistant Agricultural Instructor and assumed duties on the 1st April.

13. Library.—Mr. L. A. Rijk was in charge of the library throughout the year.

ADVISORY COMMITTEE.

14. The Advisory Committee was composed of the following members:

The Secretary for Agriculture (*Chairman*);

The Hon'ble Mr. J. W. Campbell, m.l.c.;

The Orang Kaya-Kaya Panglima Kinta;

Mr. L. P. Jorgensen;

Mr. A. W. Stanton;

Mr. G. E. Henning;

Mr. D. S. Gardner.

ADVISORY COMMITTEE (Chinese Agriculture).

15. The Advisory Committee (Chinese Agriculture) was composed of the following members:

The Secretary for Agriculture (*Chairman*);

The Chief Agricultural Field Officer;

Mr. Khoo Keng Hooi;

Mr. Yap Tai Chi;

Mr. Yap Tai Seng.

RUBBER.

16. Markets.—The rubber market made an excellent recovery during the year, due to the restriction of output and also to activity in the motor trade, especially in America. The price of rubber in the Singapore market opened at 67 cents per lb., and remained at about this figure till the end of March, when a steady rise commenced, which culminated in a price of $1.74 per lb., in the middle of July. The price then dropped rapidly to between $1.35 and $1.20 per lb., but rose again in October and reached its highest point for the year at $1.80 per lb., in November. It then dropped to about $1.50 per lb., and recovered to $1.58 per lb., at the end of the year.

17. Exports.—The export of rubber from the Federated Malay States was 118,590 tons compared with 93,507 tons for 1924. These exports represent 115,038 tons at minimum duty and 3,552 tons at excess duty. The exports included 2,292,282 gallons=4,181 tons in the form of latex, compared with 783,491 gallons in 1924. A number of additional estates have arranged contracts for the direct sale of latex to the United States Rubber Plantations Incorporated.

18. Standard Production.—The "Standard Production" for the third year of Restriction (November 1st, 1924, to October 31st, 1925), was placed at 159,874 on the basis shewn below. For the purposes of comparison the figures for 1923 and 1924 are also given:

	1925.	1924.	1923.
Estates over 100 acres	106,816	94,873	107,557
Holdings between 25 and 100 acres	10,741	9,420	10,973
Small holdings	42,317	30,990	44,000
Estimates for properties not assessed	—	982	—
Total ...	159,874	142,264	162,350

19. Stocks.—The stocks of rubber held in the United Kingdom on the 1st January, 1925, were 32,376 tons and these were reduced to 6,250 tons at the close of the year.

20. General.—The marked improvement in prices in the latter part of the year indicates the effect of control of output. The chief disadvantage however is that capital which might have been directed to other crops such as oil palms is again been lured to the plantation rubber industry.

21. Tapping.—On the larger estates, conservative methods, consisting chiefly in alternate day V tapping or periodic daily tapping for several months, followed by resting periods, are still being continued.

There is little doubt that, on all well conducted estates, these methods will be continued, even when "full production" is again established; since it is realised that such methods conduce to better health of the trees, a smaller incidence in respect of pathological and physiological diseases, and conservation of bark.

22. Cultivation and General Sanitation.—Considerable interest is being taken in the problem of manuring of rubber areas, although, apart from certain experiments carried out by a large company in Sumatra, no positive results are available, and, in cases in which the application of artificial fertilisers has been advised by the Agricultural Chemist, the laying out of trial plots in the first instance has been recommended.

A considerable difference of opinion is held in regard to the effect on rubber trees of the growth of ferns, which have been allowed to develop on hilly areas. Observations are being made and experiments initiated by the Agriculturist (Rubber) on several estates, in order to arrive at the truth. In view of statements which have been published on the longevity of the rubber tree and the economic life of the tree in respect of yields, observations are being made by the Agriculturist (Rubber) on some of the oldest trees in the country on a number of estates, on which the conditions in respect of environment, previous tapping history and other factors vary. The views held by this department are that, provided the conditions are satisfactory, the chief factor which fixes the economic life of the tree, based on trees, with a tapping history of about 20 years, is disease, particularly certain root diseases, which may have existed for some years without discovery and treatment.

A large number of estates have been visited by the Agriculturist (Rubber) and advice given on various problems such as soil erosion, drainage, tapping, and bud-grafting. The Chemical Division has also carried out a large number of soil analyses and advice has been given on manuring or other methods of treatment where necessary.

The cultivation of leguminous cover crops on rubber estates is increasing. Calopogonium mucunoides is the most popular and successful cover crop on young areas. Centrosema pubescens is also a very good cover crop.

The increased price of rubber, resulting in general prosperity, has enabled both owners and large estates and small holdings to clean up neglected areas.

23. Diseases and Pests: Pink Disease (*Corticium Salmonicolor*) has not increased to any extent and its treatment and control continue to receive careful routine attention. The small area of young trees, between two and six years, on which the attacks are more prevalent and severe has tended to restrict damage.

Mouldy Rot (*Sphæronema Fimbriatum*).—All available information regarding this disease was collected by the Agricultural Field Officer and the Mycologist in a special bulletin, No. 37, published in December, 1925. Treatment and control received careful attention on the lines described in the special bulletin and small holders are beginning to recognise the value of treatment. New centres of infection, including Province Wellesley and South Kedah, have been reported. Wet weather at the end of the year, combined probably with a considerable migration of tappers, caused a vigorous recrudescence of the disease, which will probably subside with the subsequent dry weather.

Patch Canker (Claret coloured bark canker, etc.), caused in other countries by Phytophthora faberi, has been found in Malaya to be caused by a fungus more closely related to the genus Pythium. A short account of this disease has been published in the *Malayan Agricultural Journal* and a full account will be published later.

Brown Bast.—The Keuchenius method of isolation of Brown Bast by means of deep cuts has only been partially successful in Malaya. The method requires very careful inspection and treatment of individual trees. The disease is less in evidence than a few years ago.

Root Diseases.—Interesting and valuable observations have been made by the Mycologist in connection with "Wet Rot" caused by Fomes Pseudo-Ferreus, which is believed by many to be probably the chief limiting factor affecting the longevity of Hevea. These observations indicate the cause of the apparent "cycles of disease" and show the necessity of an exceedingly careful examination of all lateral roots and the severance of all lightly infected lateral roots of trees in the top nine inches of soil in the vicinity of badly infected trees.

Secondary Leaf Fall.—Heavy rains early in the year, following a prolonged dry spell at the end of 1924, caused uneven wintering and a typical secondary leaf fall. An investigation showed no indication of Phytophthora, which is responsible for "secondary leaf fall" in Burmah and Ceylon, the most prominent fungus present being a Gleosporium. The areas of infection were restricted by isolation of attacked trees, by felling surrounding trees or cutting off adjacent branches.

Leaf Mildew (*Oidium Sp.*).—Severe attacks of this disease developed on the renewing foliage of trees on one or two estates, after wintering, but the disease disappeared in dry weather. Careful observations should be kept when this disease is found, in case suitable weather conditions cause it to persist for a long period.

General.—Attacks by white ants, Termes (Coptotermes) gestroi, have been prevalent on some estates. The use of mercuric chloride is much in vogue. Although this gives temporary relief, the Entomologist is of opinion that permanent control should be the objective on all estates. Localised attacks of bark by caterpillars of various moths have also been noted and dealt with.

The Mycologist also states that the high price of rubber and shortage of tappers has led to deeper and more careless tapping, resulting in wounds and subsequent attacks by moulds (a common *Fusarium Sp.* and a *Cephalosporium Sp.*) simulating "Mouldy Rot." Early painting, the importance of which may be emphasized, has been adopted generally in such cases.

24. Physiological Investigations.—In continuation of previous work, investigations on chemical and physical phenomena connected with coagulation and investigations of proteins and other non-caoutchouc constituents of latex have been carried out by the Plant Physiologist, and have led to increased knowledge of the constitution of latex. Records of this work have been published in several numbers of the *Malayan Agricultural Journal*. Other investigations of yield have also been recorded in the same journal.

25. Chemical Investigations.—Investigations have been continued on the determination of the "dry rubber" content of latex. This work is of importance in connection with the extension of sale and export of latex.

An investigation of the effect of periodic systems of tapping on the quality of rubber confirmed results published by De Vries to the effect that alterations of tapping and resting affect the rate of cure. The rubber obtained from trees, after a prolonged period of rest, has a slow rate of cure during the early stages of renewal of tapping, which settles down to a more constant and rapid rate of cure after tapping has proceeded for three or four weeks. Full details of the records of this investigation, including the effect of the system on yields (the tapping experiments being carried out on the H.A.P.M. Estates in Sumatra under the control of Mr. J. Grantham) have been published in the *Malayan Agricultural Journal*. A continuation of investigations on the effect of the addition of alkaloids to rubber, as a result of previous work by the Agricultural Chemist on the effect of cinchona alkaloids, has led to interesting results on the effect of emetine and ipecacuanha roots, in accelerating the rate of cure of rubber. The results have been published in the *Malayan Agricultural Journal*.

Investigations on the effect of mechanical impurities (soil particles, bark and other ingredients) on the variation of tensile strength and fortuity of breaking point of the vulcanised rubber shew that these additions do not affect the latter, although they result in some cases in a decrease of the tensile strength.

A report on the substitution of formic acid for acetic acid in the coagulation of latex, has been published, owing to the interest taken recently in this coagulant, as a result of its lower price. The report draws attention to investigations on this problem published by the Chemical Division in 1918.

Investigations of various footwear sole materials composed of rubber have been carried out on behalf of the Federated Malay States Rubber Propaganda Committee. The results show that one locally manufactured product is an excellent substitute for leather.

Experiments on the preservation of fruit by dipping in latex have not proved successful.

26. Bud-Grafting.—Records of yields from bud-grafted trees have been made by the Agriculturist (Rubber) on an area kindly placed at our disposal by Major Gough. The initial results show considerable promise, especially when compared with control trees from normal planting. These investigations are being continued.

27. Small Holdings.—The Agriculturist (Rubber), at the request of the Advisory Committee, has inspected a large number of small holdings, and his observations show, *inter alia*, that large areas of rubber growing in grass, fern and secondary jungle growth are of good appearance and have excellent bark.

As a rule, trees over ten years of age have been tapped severely, but in many cases, recovery is possible by resting and, as would be expected, there is considerable variation between such holdings even in the same district. The yields are surprisingly good, except where the soil conditions or environment are poor. An illustrated bulletin on "Cultivation of the Rubber Tree on Small Holdings" has been published in Malay and distributed.

28. Rubber Research Institute.—The Rubber Research Institute has now been definitely incorporated by Enactment. The Board of the Institute has been appointed and steps taken for the appointment of a Director and certain properties have been acquired for staff and temporary laboratory accommodation.

COCONUTS.

29. Markets.—The price of copra was $12.56 per pikul in January dropping to $11.70 in March and rising again to $12.34 at the end of the year.

The exports of copra from the Federated Malay States for 1923 to 1925 are shown in the following table:

State.	Quantity in pikuls.			Value in dollars.		
	1923.	1924.	1925.	1923.	1924.	1925.
Perak	588,771	647,710	672,288	5,788,380	6,914,055	7,830,274
Selangor	218,911	216,773	259,219	2,239,237	2,427,188	2,909,119
Negri Sembilan ...	8,257	19,805	37,570	85,401	203,930	463,494
Pahang	8,089	9,424	5,278	77,683	95,839	57,412
Total F.M.S. ...	824,028	893,712	974,355	8,190,701	9,641,012	11,260,299

There has been no extension in local mills for the manufacture of coconut oil from copra.

30. Yields.—Monthly records of individual yields of coconuts on two estates, on which observations were commenced in 1920, have been continued.

These records from 530 palms have shown definitely a wide range of variation in fruit production per palm per annum under uniform conditions while variation in other characters are also indicated. The variation has been from 5 to 150 nuts per palm on one estate. The results also indicate that good yielders remain proportionately good from year to year and poor yielders remain poor, and show the need of selection experiments. The results are being applied practically at the Coconut Selection Experiment Station, Klang. This experimental area suffered from wet weather, but treatment in respect of drainage and mounding has effected considerable improvement in the palms.

An article on "The effect of tapping coconut palms for toddy on the copra and oil produced from subsequent fruiting" has been published in the *Malayan Agricultural Journal*.

31. Cultivation and Sanitation.—One of the principal problems on coconut estates, which are almost invariably situated in flat alluvial lands in proximity to the sea or on the banks of rivers, is drainage. A high water table prevents extension of the root system. This has been observed particularly on one or two estates, on which the yields have decreased considerably.

On permatang (sandy ridges) areas which exist frequently to a considerable extent on some coastal areas, a high water table is however desirable, as such areas suffer, especially, during dry weather, owing to the porosity of the soil. Some of these areas have been examined and found to consist of almost pure sand, with little or no plant nutrients. It is doubtful whether cultivation of coconuts on such areas is an economic proposition. Peculiar unproductive areas, varying considerably in extent, have been investigated on several coastal estates. The exact reason for the poor appearance of the palms and yields of fruit are unknown and experimental manuring has been recommended.

The cultivation of cover crops on coconut estates is extending and a series of interesting experiments are being carried out on one large estate, as a result of recommendations by the department.

32. Diseases and Pests.—Investigations on pathological diseases have been continued, but are providing a baffling problem. The Mycologist reports that similar phenomena are being met with in other countries and the cause of the most important diseases still remain obscure. Numerous enquiries in respect of damage to young coconuts by the larvæ of the moth Setora nitens have been received. Spraying with lead arsenate has been recommended by the Entomologist and found to be effective. Young palms, especially on areas on which giant mimosa is being grown as a cover crop, have been attacked by grasshoppers (*Valanga nigricornis*); the cover crop is considered to be the predisposing cause.

Outbreaks of attacks by the moth Artona catoxantha have been recorded. In connection with this pest, it is pleasing to note that a visit has been paid to Malaya by the Entomologist of another Colony, where a closely related pest (*Levuana iridescens*) is causing considerable damage, and that this visit resulted in the despatch of parasites on this pest, which it is anticipated will result in the control of the pest in the Colony concerned.

Considerable assistance was rendered by the Entomologist of the Department of Agriculture in this connection.

Plesispa Reichei has been recorded as causing serious damage to young palms on some estates and measures advised for its control have proved satisfactory.

Black beetles (*Oryctes rhinoceros*) have been kept under control, but require constant attention. The use of small "bee-hive" incinerators for the destruction of refuse heaps, which form breeding grounds for this pest, is increasing, but in some cases there are not of sufficient capacity. The Red Stripe Weevil (*Rhynchophorus Schach*) has not been much in evidence.

In Pahang, damage was done by squirrels and elephants. Considerable improvements could be effected in the destruction of squirrels by means of traps, but owners are usually too apathetic to use them.

33. Dwarf Coconuts.—Considerable improvements have been effected on one large estate, on which dwarf coconuts have been planted as the sole crop. Several small ex-service areas have also been planted with dwarf coconuts and information of value in respect of this type of coconut should soon be available.

OIL PALMS.

34. Areas Cultivated.—Considerable interest is still being taken in the extension of cultivation of this crop, in spite of a set back due to attraction of capital to further rubber planting, owing to the present economic position and anticipated prospects.

The following figures in regard to areas under cultivation are of interest:

Perak.	Selangor.	N. Sembilan.	Pahang.	Total F.M.S.
430 acres ...	7,659 acres ...	Nil ...	323 acres ...	8,412 acres

The most noticeable extensions have been in Selangor in which 1,643, 1,954 and 1,654 acres have been planted in 1923, 1924 and 1925, respectively.

35. Markets.—The exports of palm oil and palm kernels from the Federated Malay States from 1923 to 1925 are as follows:

	1923.	1924.	1925.
Palm oil (tons)	195 ...	286 ...	536
Palm kernels (tons)	50 ...	81 ...	110

The comparative increase in palm oil over palm kernels is due to the more efficient extraction of palm oil by modern machinery. During the year the price of palm oil varied from about £38 to £42 per ton and the price of palm kernels from £21 to £22 per ton.

36. Chemical Investigations.—Investigations on the bleaching of palm oil with the object of rendering it suitable for edible (cooking) purposes locally as a substitute for imported groundnut oil have been carried out by the Chemical Division with satisfactory results. The bleached oil has been used and found satisfactory for cooking purposes, although it may prove difficult to break down prejudice in placing such an oil on the local market for general use. A large number of samples of bleached oil were distributed at the Malayan Agri-Horticultural Show and Trade Exhibition held in Kuala Lumpur in August, at which an attractive display in connection with the oil palm was exhibited.

PADI (Rice).

37. Crops.—The padi crops in the 1925 harvest were good, except in Pahang. In the Krian irrigation area the crop exceed 16½ million gantangs (gallons) compared with an average of about 14 million gantangs over a series of years previously. This is attributed to (*a*) good season, (*b*) extensive planting of heavy yielding strains supplied by the department, (*c*) comparative freedom from insect pests.

The crops for the forthcoming season will be about 25 per cent. below average, owing to the dry weather during the planting season and the subsequent floods, which destroyed a portion of the crops.

Statistics of padi crops for the Federated Malay States are attached.

38. Selection Work.—Experimental selection work at the Titi Serong Rice Experiment Station was continued along lines proved to be successful during previous years and crops above the average were obtained. A new Test Station was opened at Dong in Pahang. Twenty-six selected strains were subjected to yield tests. This collection of pure strains, from varieties differing in many important characters, was made in order to meet a demand for seed suitable for dissimilar soil and other conditions in different districts.

The demand for seed padi was heavy, owing to the popularity of the strains isolated. The distribution amounted to 9,486 gantangs in the Krian district, consisting of selected Seraup and Radin strains in the proportion approximately 2 to 1.

In addition, 3,592 gantangs of seeds, principally composed of Radin strains, were distributed in other parts of Malaya.

In the Krian district, it is estimated that about 30,000 acres were planted with strains originally obtained from the experimental station and it is anticipated that, in a short time, practically the whole Krian irrigation area will be planted with improved races.

39. Cultivation and Manuring.—Experiments in methods of cultivation and manuring were continued and results in certain parts are considered very satisfactory, except where the experiments were spoilt by flooding. Experiments to test the effect of ploughing before planting demonstrated the beneficial results in the increased crops obtained. The burning of padi straw, weeds and grass has been shewn to result in decreased crops, while changkolling (digging) of the soil leads to increased crops. Valuable results, similar to those already obtained in Krian, will, without doubt, be obtained in time in other padi districts.

40. New Areas.—The survey of a large area between the Perak River and Sitiawan is being undertaken but had to be postponed, owing to wet weather, and consequent floods. In connection with this survey the Chemical Division is co-operating in a survey of the soil. Other similar areas in Pahang are also being surveyed and the soils examined.

41. Pests and Diseases.—*Leptocorisa Spp.* again proved troublesome in some districts especially Kuala Pilah, but, thanks to the assistance of the District Officer, a fair yield of padi was obtained, in spite of the attacks of this pest. Reports of serious damage of padi were received from various districts and in most cases a Fulgorid Bug (*Delphacinæ*), possibly *Libernia sordescens* was found to be present. Observations indicated that the attacks by the pest were secondary and that the damage was due primarily to delayed planting and excessive rains subsequently. A change to more normal conditions effected an improvement in the padi and the disappearance of the insects.

42. Rat Campaign.—The special campaign of rat destruction in the Krian area was continued with success. From the commencement till the end of 1925, 661,794 rats have been destroyed. These include 268,638 destroyed by schools and 112,123 destroyed by the Public Works Department. Demonstration stalls in connection with rat destruction were arranged at the Agri-Horticultural Shows in Kuala Lumpur and Taiping and efforts made to arouse interest among padi growers in methods of destruction.

43. Reslimed Land.—Experiments at Kota and Kamunting, for restoring the fertility of reslimed land, show that the cover crops, Tephrosea candida and Mimosa invisa may be successful. Experiments on additional areas were spoilt by heavy rains and show that a spell of dry weather is necessary for establishing the cover crops.

MISCELLANEOUS (MINOR) CROPS.

44. Statistics.—The cultivated areas under minor crops in the Federated Malay States are approximately as shown in the following table.

Crop.	Perak.	Selangor.	N. Sembilan.	Pahang.	Total F.M.S.
African oil palm	430	7,659	Nil	323	8,412
Pineapples	362	3,933	691	8	4,994
Nipah*	150	1,473	643	2,000	4,266
Coffee	120	3,418	Nil	326	3,864
Tapioca	15	746	1,188	537	2,486
Gambier	Nil	138	1,860	323	2,321
Tuba	248	2	168	57	475
Kapok	115	83	Nil	262	460
Arecanut	15	137	Nil	40	192

The figures for kapok and areca nuts do not include small holdings partly planted with these crops. A census of kapok trees made four years ago showed 100,000 trees, equivalent to 1,000 acres approximately.

45. Nipah Palm.—On the two estates in Selangor on which nipah palm is being cultivated for the production of alcohol for power purposes, the progress made was satisfactory. About 900 acres are already planted and experimental tapping will be commenced soon on palms which are already producing fruiting stalks.

The experimental area planted by the department has been maintained, but tapping experiments on a leased area have been discontinued, since it is considered that sufficient information is available *re* methods and yields, as far as indigenous, non-cultivated palms are concerned.

A report by Mr. J. H. Dennett on nipah palm areas and the production of alcohol from the palm in British North Borneo was published in the *Malayan Agricultural Journal* and gives valuable information on problems of manufacture.

46. Tapioca—Crops and Market.—Information collected by the Agricultural Economist shows about 2,500 acres planted with this crop in the Federated Malay States. The largest area (about 16,000 acres) exists in Johore.

The exports from the Federated Malay States were as follows:

	Quantity.	Value.
Tapioca Flake	1,614.07 tons	$227,766
,, Flour	849.19 ,,	23,873
,, Pearl	716.42 ,,	126,608
,, Root	60.25 ,,	983
,, Refuse	1,195.04 ,,	17,601

Investigations.—A number of varieties are being cultivated at the Experimental Plantation, Serdang, in order to ascertain the amounts of the most important plant constituents—nitrogen, phosphorus and potash, removed from the soil by an average crop.

An investigation of the soils on the plots is also being conducted.

It can be stated that, provided fertility is maintained by the application of suitable fertilizers, and that, on hilly or undulating land, soil erosion is prevented, a large number of crops can be grown continuously. In the absence of such treatment, the yield is reduced considerably after two or three crops have been harvested. Two crops, grown as a catch crop in rubber areas, will not affect the subsequent growth of the rubber. The problem of manuring however depends largely on the price of tapioca. The importance of this crop lies in its value as a potential food crop and the possible production of power alcohol. Large quantities of tapioca starch are also converted into dextrin, which is used as an adhesive.

47. Coffee.—Information collected shows a total area of 3,864 acres under coffee, nearly the whole of which is in Selangor.

48. Pineapples.—The following table, giving the exports and value of canned pineapples from Malaya since 1919, indicates the importance of this crop:

Year.	Total cases.	Total value.
1919	255,873	3,286,001
1920	446,893	7,178,016
1921	662,360	6,210,383
1922	710,671	6,694,098
1923	889,941	5,874,858
1924	39,204 (tons)	8,873,977

* Includes small holdings on which the nipah palm is grown for the preparation of attaps.

With the exception of one factory in Selangor however, which utilises fruit grown in the neighbourhood, chiefly by small holders, the canning factories are situated in Singapore or South Johore and most of the cultivated areas are also in Johore and Singapore.

The absence of competition against the one factory in Selangor for the purchase of the fruit has however adversely affected the price obtained for fruit.

An exhibit of canned pineapples, including varieties of fresh fruit and photographs illustrating the industry, was sent to the Nations' Food Exhibition, London. As a result of opinions expressed by buyers on the variability of Malayan canned pineapples, canners were addressed in regard to more careful grading and advice given *re* use of labels.

Owing to the present satisfactory market position, as far as the canners are concerned, it is doubtful whether improvements will be effected.

Arrangements have been made by the factory in Selangor to install plant for the utilisation of the waste material.

49. Fibres.—At the present time, no fibre crops are cultivated and it is doubtful whether the cultivation of sisal hemp or any other fibre plant will be established on a large scale for some time, owing to the present and prospective situation in respect of the plantation rubber industry.

In the meanwhile however, investigations will be continued by the department, so that useful information will be available.

Reports have been received from the Imperial Institute on sisal hemp, pineapple fibre and caraguata fibre prepared at the department. The sisal hemp was stated to be equal to the best East African grades (£50 per ton), the pineapple fibre was also valued at an equivalent price, if available in commercial quantities, while the caraguata fibre was valued at only £36-£37 per ton.

Machinery has been installed recently at the Experimental Plantation, Serdang, for the extraction of sisal and Mauritius hemps, which are being grown there.

Sisal Hemp.—Samples of sisal hemp have been prepared at the department and converted into ropes at the Convict Establishment, Taiping. The rope has been found satisfactory as chick ropes and the Public Works Department has asked for further consignments.

Pineapple Fibre.—A bale (3 cwts.) of pineapple fibre was prepared and despatched to the Belfast Rope Works with the object of spinning the fibre and, if suitable, the manufacture of a textile material by the Textile Department of the Municipal College of Technology, Belfast.

Native spinners at Port Dickson, Kedah and Kelantan, to whom samples of fibre were sent, have been unable to spin the fibre. The cost of extraction of the fibre has proved that its preparation will be unremunerative except as a "cottage" industry, unless it can be converted into a textile material.

Roselle Fibre.—Enquiries were received from Europe and America for consignments of roselle fibre at remunerative prices. The crop is however no longer cultivated to any extent in Malaya and it is unlikely to attract attention under present conditions.

Manila Hemp (*Abaca fibre*).—The Manila hemp plant has been established successfully at the Experimental Plantation, Serdang. The fibre has been extracted and investigated by the Chemical Division and compared with fibre from the Philippines and Borneo. The results of these investigations have been published in the *Malayan Agricultural Journal*.

In addition, samples of fibre from wild banana (pisang) plants have been examined but found to be inferior in tensile strength. Enquiries have been sent to Indo China for bags and mats said to be manufactured in that country from wild pisang fibre.

Miscellaneous Fibres.—Reports on investigations on bark fibres from Hibiscus macrophylla (Tutor fibre) H. floccous (Baru fibre) Artocarpus Kunstleri (Terap fibre) received from the Forest Department have been published in the *Malayan Agricultural Journal*. The utility of these as a source of raw material for paper manufacture depends on the quantities and availability of the material.

Kapok.—A small trial shipment of kapok is being prepared for shipment to America for valuation and report.

Several areas of kapok have been planted under ordinary estate conditions, but no information is yet available in respect of crops.

50. Tuba (*Derris Spp.*).—As a result of enquiries sent to various countries, it was ascertained that while the use of tuba as an insecticide was confined to a few firms, others were interested, but had little knowledge of the product.

It may be concluded that the cultivation of this product in Malaya will show no advance until the difficulties in respect of conditions of marketing are solved. These include knowledge of the quality of the raw material in regard to its toxic properties and reduction of bulk in order to reduce cost of freight. Further investigations of the relative toxic properties of varieties and roots of different age are necessary and also on grinding the roots and baling of ground root.

A consignment of 10 cwts. of roots is being sent to Dr. McCombie at the Biochemical Laboratories, Cambridge University, for research on the toxic constituents of the root.

A report on investigations on Tuba was published by the Acting Entomologist (Mr. B. A. R. Gater) in the *Malayan Agricultural Journal*. One point of interest is that certain insects feed with impunity on the dried roots and also destroy the toxic properties. If tuba is stored therefore, fumigation may be necessary, before the root is shipped.

51. Gambier.—A survey of the production and marketing of gambier showed the chief centres of production to be Sumatra and Malaya. Java is also a large producer, but unable to satisfy its internal consumption.

About 8,000 tons is exported chiefly through Singapore mainly to British India, the United Kingdom and the United States of America. At present prices it is a useful catch crop on young rubber and oil palm estates.

An investigation of a large number of samples of gambier received from various merchants, who deal in this product, gave valuable information, which has been published in the *Malayan Agricultural Journal*.

Two cases of gross adulteration, which, judging from the valuation of the samples had not been detected by the merchants, were found.

52. Areca Nuts.—In consequence of a comparison of market prices of areca nuts in Singapore, Colombo and Calcutta, which indicated a much higher price in the Ceylon product, samples were obtained from various countries and opinions of merchants were invited.

The problem of difference in varieties is being investigated by the Economic Botanist. It appears probable however that conditions of treatment and grading are chiefly responsible for the differences in price.

53. Annatto.—In view of the prohibition of use of artificial dyestuffs in food products in Great Britain, the possibility of increasing the cultivation and export of annatto has been considered. As a result of enquiries and reports and valuation on commercial samples sent to London, it was found that the cultivation and export of this crop was not justified with the present low prices offered.

54. Fruits.—During the latter part of the year, a very heavy crop of durians was obtained in Perak, but in Selangor, while other fruits were good, the durian crop failed.

Satisfactory progress is being made with the fruit growing area at the Experimental Plantation, Serdang, and at the Experimental Station, Pekan. The Kuala Kangsar Experimental Plantation has been transferred to the control of the Agricultural Field Officer, Perak North, to be used as a fruit station.

55. Fodder Grasses.—Experimental work on various fodder grasses is being continued at the Experimental Plantation, Serdang. Analyses of fodder grasses, from the point found of their value for cattle and horses have been compiled by the Chemical Division.

GENERAL.

56. Agricultural Shows.—A very successful Agri-Horticultural Show and Trade Exhibition, under the auspices of the Malayan Agri-Horticultural Association, was held at Kuala Lumpur from July 31st to August 3rd and attracted 70,000 visitors. The Department of Agriculture concentrated its efforts on demonstration stalls in connection with (*a*) Oil Palm products, (*b*) Fibres, (*c*) Gambier, (*d*) Jelutong, (*e*) Rat Destruction and (*f*) Food crops and cover crops from the Experimental Plantation, Serdang.

District Agri-Horticultural Shows were held at twelve centres in the Federated Malay States and three centres in the Straits Settlements, including Brunei.

57. British Empire Exhibition.—Additional exhibits, consisting chiefly of oil palm products, preserved fruits and pickles prepared by Mrs. Kinsey, special rubber mats and other products, prepared on Devon Estates, Malacca, were sent to the Malaya Pavilion, British Empire Exhibition.

58. Nation's Food Exhibition.—The Governments of the Straits Settlements and the Federated Malay States were represented by an exhibit of oil palm, tapioca and pineapple products at the Nation's Food Exhibition, Olympia, London. Major C. D. V. Georgi, o.b.e., was in charge of the exhibits and responsible for their arrangement. This exhibit was the only official exhibit sent by any colony or protectorate in the British Empire. The exhibits were used subsequently in the Malaya Pavilion at the British Empire Exhibition.

59. Incorporated Society of Planters' Conference and Lectures.—A successful conference under the auspices of the Incorporated Society of Planters was held in Kuala Lumpur, at which several lectures and demonstrations were given by officers of the department.

A number of lectures were delivered by officers of the department, before various branches of the Incorporated Society of Planters.

60. Agricultural Instruction.—A new scheme for the instruction of Malay Officers of the Department came into operation at the end of 1924, the staff consisting of the Agricultural Instructor (Malay Officers) and an Assistant Agricultural Instructor. This scheme, in which the undivided attention of one officer is given to instruction in elementary science and agriculture, is a considerable improvement on the previous scheme. It is probable that even the present two years' scheme of instruction will prove too short, especially in regard to practical training in agriculture and the cognate sciences.

Twenty-six new apprentices were selected of whom one failed to report and two have resigned. Progress was impeded by non-completion of lecture room and laboratory which were not ready until November.

In conference with the Malay Officers' Training Committee the defects of the present system of training have been considered and certain improvements effected. There is no doubt that the standard of knowledge gained by the present course is insufficient and training at a local school of agriculture, with its attendant advantages, would be preferable.

61. School Gardens.—All school gardens, except those in Perak, have been visited and advice given to teachers in connection with soil improvements and crops. Supplies of seed have been organised at definite dates and tools provided at the request of Inspectors of Schools. Improved varieties of sweet potatoes and ground-nuts have been distributed from the Experimental Plantation, Serdang. In Perak, this work is organised and carried out by the Inspector of Schools and the advice of the Agricultural Field Officers is given when required. The number of school gardens is increasing steadily and teachers and pupils generally show considerable interest in the work. In the Krian district several schools have their own padi plots on which all the lighter operations are carried out by the pupils under an experienced padi grower. This might be extended to other padi districts.

62. Chemical Investigations.—Apart from the investigations already indicated in connection with rubber, coconuts, oil palms, fibres, gambier and tapioca, researches in connection with problems mentioned below have been carried out.

Investigations have been made on the "jelutong" content of jelutong latex in connection with tapping experiments carried out by the Forest Department. The product is being collected and exported in considerable quantity to the United States of America as the principal ingredient of chewing gum. Experiments on methods of coagulation and preparation with a view to testing the keeping qualities of the product are being continued.

A number of miscellaneous oils and fats and essential oils have been investigated, principally on behalf of the Forest Department.

Investigations on malau (lac) have been continued. These show that the local product closely resembles Indian lac.

Investigations of the nicotine content of tobaccos grown at the Experimental Plantation, Serdang, have been continued.

Further analyses of varieties of sugar cane, grown at the Experimental Plantation, Serdang, have been carried out and are being continued.

One hundred and three samples of soils from rubber, coconut, oil palm, padi and other areas have been examined.

Experiments have been commenced on the preparation of A.D.C.O. fertilizer (synthetic farmyard manure) from lallang and other waste vegetable matter.

63. Mycological Investigations.—In addition to the researches carried out on the major crops previously mentioned, the Mycological Division has given attention to (1) a disease of Sireh vine caused by a species of Phythophthora, (2) the spraying of diseased coffee bushes with Bordeaux mixture and Agrisol, (3) a tuber disease

of Jerusalem artichokes, due to a fungus, Sclerotium Rolfii, well known in other countries; little success attended various methods of treatment, (4) a root disease of Aleurites Montana (candle-nut trees), (5) Die-bark disease on Aleurites Triloba, at the Experimental Plantation, Serdang. Spraying with Bordeaux mixture and heavy pruning of diseased branches controlled the disease. Three different species of fungi isolated from diseased specimens of local species of Rubus collected on Fraser's Hill were sent to the Director of Agriculture, New Zealand, to enable the Department to control the spread of the wild blackberry (Rubus fruticosus).

At the request of the Council of the Society for Industrial Research, investigations on micro-organisms causing decay in fabrics were undertaken. Fifty-one types of cloth were exposed and records taken for eleven months. Many of the fabrics were badly attacked and a report was forwarded on the results.

In connection with the "Panama" disease of bananas caused by Fusarium cubense, visits were paid to the department by Dr. Harland of the Imperial Department of Agriculture, West Indies, and Dr. Reinking of the United Fruit Company, United States of America, with the object of studying the local varieties of bananas. No investigations on diseases of bananas have been carried out in Malaya and the "Panama" disease has never been prominent in this country.

Dr. Reinking, who was provided with facilities in the Mycological laboratories of the department, succeeded in isolating Fusarium cubense from specimens from Siam.

64. Entomological Investigations.—In addition to the specific work on insects mentioned under the various crops, other insects have been bred and, as far as possible, identified through the kind assistance of the Director of the Bureau of Entomology and Systematists in the British Museum, America, Italy and Spain. Efforts have been concentrated on obtaining a complete record of pests on all cultivated plants in Malaya, including their habits and life histories. About 1,040 batches of insects, representing some 6,000 insects, have been passed through the breeding cages. Further studies of the coconut moth, Artona catoxantha and its parasites have yielded valuable information.

Records made on Leptocorisa species indicate that L. Acuta is the most injurious to the ripening grains of padi. Proprietary articles alleged to render timber immune to attack from white ants have been tested and recommendations for the control of this pest in buildings have been frequent. The division is collaborating with the Forest Department on the possibilities of lac culture in Malaya and an area for experimental work has been planted with "Mahang" (*Macaranga Sp.*) and "Balik Angin" (*Mollotus Sp.*) on which lac incrustations are usually found.

A pest gang to deal with insect pests has been organised and established on the Experimental Plantation, Serdang.

Work has been initiated in connection with the possibility of silk worm breeding and production of silk in Malaya.

65. Library and Publications, Etc.—The library has been removed from the main building to a detached building which has been rendered fire proof as far as possible.

A cross indexed catalogue of books has been completed and a catalogue of bound volumes of periodicals is being prepared. The librarian has also been engaged on translation of Dutch and German literature.

The *Malayan Agricultural Journal* has been published regularly. One special Bulletin No. 37, "The Mouldy Rot" disease of Hevea Brasiliensis has been published.

Although the number of local subscribers to the *Malayan Agricultural Journal* has increased by 100 per cent. during the year, the number of such subscribers is still very low. Four quarterly numbers, comprising the third volume of a bulletin in the Malay language (Warta Per-usahan Tanah) were issued. Three thousand copies of each number were distributed, mostly free, to Malay readers in all States of the Peninsula and to Malay vernacular schools. This publication serves a very useful purpose.

Additional photographic negatives for the preparation of lantern slides on agricultural subjects have been obtained and sent to the Malay States Information Agency, after examining the Agency's present series of lantern slides.

B. J. EATON,

23rd April, 1926. *Acting Secretary for Agriculture, S.S. and F.M.S.*

Federated Malay States Government Press.